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Comments:
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represented as pixels, each pixel having a plurality of color components, and each color component having a respective density, the method comprising:

(a) determining whether or not each one of the densities of a pixel's color components corresponds to a white or approximately white area in an image, the determining relating to each one of the densities being based on information concerning all densities of all the respective color components of the pixel;

(b) converting the density of each color component so that all the densities for the pixel are changed together into lower densities when it is determined in the determining step that the densities correspond to a white or approximately white area of the image; and

(c) determining, for each pixel, whether or not the color image data constitutes data of a white or approximately-white image portion, the color image data including data of a white or approximately-white image portion being data to be converted by said density converting step (b), the determination being executed based on:

1) the maximum density from among the red density, the green density and the blue color density of the color image data for each pixel; and

2) the maximum difference in density between densities of the red density, the green density and the blue density of the color image data for the pixel.

29. A background noise removing method for removing background noise from color image data represented as pixels, each pixel having a plurality of color components, and each color component having a respective density, the method comprising:

(a) determining whether or not each one of the densities of a pixel's color components corresponds to a white or approximately white area in an image, the determining relating to each one of the densities being based on information concerning all densities of all the respective color components of the pixel;

(b) converting the density of each color component so that all the densities for the pixel are changed together into lower densities when it is determined in the determining step that the densities correspond to a white or approximately white area of the image; and

(c) determining, for each pixel, whether or not the color image data constitutes data corresponding to a white or approximately-white image portion, the determination for each pixel being executed based on the minimum reflectance among the red component reflectance, the green component reflectance and the blue component reflectance of the color image data for the pixel.

30. The background noise removing method of claim 18, further comprising: the step of

excluding color-image data from among the color-image data for the pixels to be converted, wherein the color-image data for the pixel to be excluded has color-image data of a pixel having an adjacent pixel located within a predetermined area from the pixel corresponding to the color-image data to be excluded, which adjacent pixel has densities not corresponding to the white or approximately white density.

31. The background noise removing method according to claim 24, wherein said density converting step (b) converts densities in the color image data so that the density ratios between the cyan density component, the magenta density component, the yellow density component and the black of the original color image data may coincide with the density ratios between the cyan density component, the magenta

density component, the yellow density component and the black the red density component of the converted color-image data.

32. A background noise removing method according to claim 18, said determining step comprising:

determining for each pixel whether or not the color-image data for the pixel comprises data corresponding to the white or approximately white density, the color-image data for the pixel being determined as data comprising the white or approximately-white density when two conditions have been fulfilled, the two conditions comprising:

1) that densities for the red component, the green component and the blue component of the color-image data for the pixel are equal to or less than a predetermined threshold value, and

2) that the color-image data for the pixel corresponds to an approximately achromatic color;

wherein said density converting step includes converting densities in color-image data for the pixel so as to change the densities into lower densities, the color-image data to be converted comprising color-image for a pixel having been determined as corresponding to the white or approximately white density.

33. The background noise removing method according to claim 32, wherein said density converting step includes: the step of

converting the densities corresponding to the color-image data into the white density.

Description

BACKGROUND OF THE INVENTION

The present invention relates to a background noise removing apparatus and method applicable to a color image processing apparatus.

The term "density" or "density level" used hereinafter is defined to be as follows: the "density" D of an object is obtained by the following equation: D=log.sub.10 (R), where R represents "reflectance" of the object; R=Rr/Ra, where Rr represents "reflected light quantity" of the object and Ra represents "applied light quantity" of the object; the "reflected light quantity" of the object comprising a quantity of light reflected by the object as a result of a light corresponding to the above "applied light quantity" being applied to the object. Further, the term "reflectance" defined above will also be used hereinafter.

The term "background noise" will now be explained. There may be a case where, for example, an original color image made on a sheet of paper is to be duplicated by means of a color image duplicator so as to obtain other sheets of paper on which duplicated images are printed. This duplication may be performed such that the original image on the sheet of paper is read by means of a scanner, and multi-value image data obtained by the reading is then output by means of a display screen (CRT) or is output by means of a printer. In this case, a conventional duplicator may duplicate "Background noise", that is, it may duplicate stains or densities appearing on the sheet of paper, other than the original image. These stains or densities may thus occur on the sheet of paper of the original image and in the duplicate of the original image. Such stains may occur as a result of, for example, ink forming the original image being rubbed accidentally so that the ink is smeared on the sheet of paper undesirably. In another example, such stains